Federation of Malysia

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ASD 901 (2006) (English): Standards For Airstrips

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AIRPORT STANDARDS DIRECTIVE 901
[ASD 901]

STANDARDS FOR AIRSTRIPS

AIRPORTS STANDARDS DIVISION
DEPARTMENT OF CIVIL AVIATION MALAYSIA

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INTRODUCTION

1. This Airport Standards Directive contains specifications that prescribe the physical characteristics, obstacle limitation surfaces, facilities and technical services that shall be provided at airstrips.

2. This Directive has been written in general terms. Specific advice could be obtained from the Authority at:

Department of Civil Aviation
Airport Standards Division
Level 1 Block Podium B 4G4 Precinct 4
Federal Government Administration Offices
62570 Putrajaya.
Phone: 03-88714000
Fax : 03-88714335

APPLICABILITY

3. The specification in this Directive shall apply to the approval, licensing and certification of airstrips.

4. The airstrip classified under this Directive applies to a code number 1 non-instrument aerodrome.

AUTHORITY

5. The Authority referred to in this Directive is the Director General of Civil Aviation.

DOCUMENTATION

1. AERODROME MANUAL

6.1 The aerodrome manual is a fundamental requirement for the approval, licensing or certification of airstrips.

6.2 The aerodrome manual shall contain all pertinent information concerning the airstrip site, facilities, services, equipment, operating procedures, organization and management.

6.3 The information presented in the aerodrome manual shall demonstrate that the airstrip conforms to specifications of Airport Standards Directive 901, other relevant Directives, the Civil Aviation Regulations 1996 and the Civil Aviation Act 1969.

6.4 The Aerodrome Manual shall take the form and contains information as detailed in Appendix A.

2. GEOGRAPHICAL COORDINATES

7.1 Geographical coordinates indicating latitude and longitude shall be determined and reported in terms of the World Geodetic System – 1984 [WGS-84] geodetic reference datum.

7.2 The order of accuracy of the field work shall be such that the resulting operational navigation data for the phases of flight will be within the maximum deviations, with respect to an appropriate reference frame, as follows -

Latitude and longitude	**Accuracy Data type**
Aerodrome reference point	30 m surveyed/calculated
Runway thresholds	1 m surveyed
Runway end	1 m surveyed
Runway centre line points	1 m surveyed
Runway holding positions	0.5 m surveyed
Taxiway centre line	0.5 m surveyed
Obstacle in Area 2 [within aerodrome boundary]	5 m surveyed
Obstacle in Area 3	0.5 m surveyed

7.3 In addition, the elevation of the specific ground positions at the airstrip, geoid undulations for those position shall be determined and reported, as follows -

Elevation / altitude / height	Accuracy Data type
Aerodrome elevation	0.5 m surveyed
WGS-84 geoid undulations at aerodrome elevation position	0.5 m surveyed
Runway thresholds	0.5 m surveyed
Runway centre line points	0.25 m surveyed
Taxiway centre line	1 m surveyed
Obstacle in Area 2 [within aerodrome boundary]	3 m surveyed
Obstacle in Area 3	0.5 m surveyed

3. AERODROME REFERENCE POINT

8.1 An aerodrome reference point shall be established for an airstrip.

8.2 The aerodrome reference point shall be located near the initial or planned geometric centre of the airstrip and shall normally remain where first established.

8.3 The position of the aerodrome reference point shall be measured and reported in degrees, minutes and seconds.

4. AERODROME AND RUNWAY ELEVATIONS

9.1 The aerodrome elevation and runway thresholds elevation shall be measured and reported to the nearest one-half meter.

5. AERODROME DIMENSIONS

10.1 The aerodrome dimension shall be determined and reported, as follows -

Length / distance / dimension	Accuracy Data type
Runway length	1 m surveyed
Runway width	1 m surveyed
Runway threshold	1 m surveyed
Stopway length and width	1 m surveyed
Clearway length and width	1 m surveyed
Taxiway width	1 m surveyed

10.2 The following data shall be measured or described, as appropriate, for each facility provided on a airstrip –

a. Runway – true bearing to one-hundredth of a degree, designation number, length, width, displace threshold location to the nearest metre, slope, surface type, type of runway;

b. Strip – length, width to the nearest metre, surface type;

c. Stopway – length, width to the nearest metre, surface type;

d. Taxiway – designation, width to the nearest metre, surface type;

e. Apron – surface type, aircraft stands;

f. Clearway – length to nearest metre, ground profile; and

g. visual aids for approach procedures, markings and lighting of runways, taxiways and aprons.

10.3 The geographical coordinates of each threshold shall be measured and reported in degrees, minutes, seconds and hundredths of seconds.

10.4 The geographical coordinates of the appropriate centerline points taxiways shall be measured and reported in degrees, minutes, seconds and hundredths of seconds.

10.5 The geographical coordinates of each aircraft stands shall be measured and reported in degrees, minutes, seconds and hundredths of seconds.

10.6 The geographical coordinates of significant obstacles in Area 2 and in Area 3 shall be measured and reported in degrees, minutes, seconds and tenths of seconds. In addition, the top elevation rounded up to the nearest meter, marking and lighting [if any].

6. DECLARED DISTANCES

11.1 The following distances shall be declared, for an airstrip –

a. take-off run available [TORA];

b. take-off distance available [TODA];

c. accelerate-stop distance available [ASDA]; and

d. landing distance available [LDA].

11.2 The declared distances shall be determined and reported, as follows -

Length / distance / dimension	Accuracy Data type
Landing distance available	1 m surveyed
Take-off run available	1 m surveyed
Take-off distance available	1 m surveyed
Accelerate-stop distance available	1 m surveyed

7. STRENGTH OF PAVEMENTS

12.1 The bearing strength of pavements shall be determined.

12.2 The bearing strength of a pavement intended for aircraft of apron [ramp] mass greater than 5700 kg shall be made available using aircraft classification number – pavement classification number [ACN-PCN] method by reporting all of the following information –

a. the pavement classification number [PCN];

b. pavement type for ACN-PCN determination;

c. subgrade strength;

d. maximum allowable tire pressure category or maximum allowable tire pressure value; and

e. evaluation method.

12.3 The PCN reported shall indicate that an aircraft with an ACN equal or less than the reported PCN can operate on the pavement can operate on the pavement subject to any limitation on tire pressure, or aircraft all-up mass for specified aircraft type[s].

12.4 The ACN of an aircraft shall be determined in accordance with standard procedures associated with the ACN-PCN method.

12.5 For the purpose of determining the ACN, the behavior of the pavement shall be classified to a rigid or flexible construction.

12.6 Information on pavement type for ACN-PCN determination, subgrade strength category, maximum allowable tire pressure category and evaluation method shall be reported in accordance to specified codes.

8. **RESCUE AND FIRE FIGHTING**

13.1 The level of protection described as Category of rescue and fire fighting services shall be reported.

PHYSICAL CHARACTERISTICS

9. RUNWAY

14.1 LENGTH

14.1.1 The runway length to be provided shall be adequate to meet the operational requirements of the aeroplanes for which the runway is intended and should be not less than the longest length determined by applying the corrections for local conditions to the operations and performance characteristics of the relevant aeroplanes.

14.1.2 Where the runway is associated with a stopway or clearway, an actual runway length less than that resulting from application of 13.1.1 may be considered satisfactory. But in such a case any combination of runway, stopway and clearway should permit compliance with the operational requirements of the aeroplanes for which the runway is intended to serve.

14.2 WIDTH

14.2.1 The width of the runway shall not be less than the appropriate dimension, as follows

Code Number	Code Letter		
	A	**B**	**C**
1	18 m	18 m	23 m

Code Letter A : Wingspan up to but not including 15 m
Outer main gear wheel span up to but not including 4.5 m

Code Letter B : Wingspan 15 m up to but not including 24 m
Outer main gear wheel span 4.5 m up to but not including 6 m

Code Letter C : Wingspan 24 m up to but not including 36 m
Outer main gear wheel span 6 m up to but not including 9 m

14.3 LONGITUDINAL SLOPES

14.3.1 The longitudinal slope shall not exceed 2 per cent.

14.3.2 Along no portion of the runway should the longitudinal slope exceed 2 per cent.

14.3.3 Where slope changes cannot be avoided, a slope change between two consecutive slopes should not exceed 2 per cent.

14.3.4 The transition from one slope to another should be accomplished by a curved surface with a rate of change not exceeding 0.4 per cent per 30 m [minimum radius of curvature of 7 500 m].

14.3.5 There shall be an unobstructed line of sight from -

a. for code letter A, any point 1.5 m above a runway to all other points 1.5 m above the runway within a distance of at least half the runway length;

b. for code letter B, any point 2 m above a runway to all other points 2 m above the runway within a distance of at least half the runway length; and

c. for code letter C, any point 3 m above a runway to all other points 3 m above the runway within a distance of at least half the runway length.

14.3.6 Undulations located closed together along a runway shall be avoided. The distance between the points of intersection of two successive curves shall not be less than the sum of the absolute numerical values of the corresponding slope changes multiplied by 5000 m or 45 m, whichever is greater.

14.4 TRANSVERSE SLOPES

14.4.1 To promote the most rapid drainage of water, the runway surface should, if practicable, be cambered except single crossfall from high to low in the direction of the wind most frequently associated with rain would ensure rapid drainage.

14.4.2 The transverse slope should not exceed the minima specified below, nor be less than 1 per cent except at runway or taxiway intersection where flatter slopes may be necessary.

Code Letter A	:	2 per cent
Code Letter B	:	2 per cent
Code Letter C	:	1.5 per cent

14.4.3 For a cambered surface the transverse slope on each side of the centre line should be symmetrical.

14.4.4 The transverse slope should be substantially the same throughout the length of a runway except at an intersection with another runway or a taxiway where an even transition should be provided taking account of the need for adequate drainage.

14.5 **STRENGTH OF RUNWAY**

14.5.1 A runway shall be capable of withstanding the traffic of aeroplanes the runway is intended to serve.

14.6 **SURFACE OF RUNWAY**

14.6.1 A The runway shall be constructed without irregularities that would result in loss in friction characteristics or otherwise adversely affect the take-off and landing of an aeroplane.

14.6.2 If a runway is paved, it shall be so constructed as to provide good friction characteristics when the runway is wet.

14.6.3 Measurement of the friction characteristics of a new or resurfaced runway should be made with a continuous friction measuring device using self-wetting features in order to assure that the design objectives with respect to friction characteristics have been achieved.

14.6.4 The average surface texture depth of a new surface should not be less than 1.0 mm.

14.6.5 When the surface is grooved or scored, the grooves or scorings should be either perpendicular to the runway centre line or parallel to the non-perpendicular transverse joints, where applicable.

10. **RUNWAY STRIPS**

15.1 A runway and any associated stopway shall be included in a strip.

15.2 A strip shall extend before the threshold and beyond the end of the runway or stopway for distance of at least 30 m, where the code number is 1 and the runway is a non-instrument one.

15.3 A strip shall extend on each side of the centre line of the runway and its extended centre line throughout the length of the strip, to a distance of at least 30 m, where the code number is 1 and the runway is a non-instrument one.

15.4 No fixed object, other than visual aids required for air navigation purposes and satisfying the relevant frangibility requirement, shall be permitted on a runway strip.

15.5 A mobile object shall not be permitted on a runway strip during the use of the runway for landing and take-off.

15.6 The strip shall be graded to serve in the event of an aeroplane running off the runway.

15.7 The surface of that portion of a strip that abuts the runway or stopway shall be flush with the surface of the runway or stopway.

15.8 The longitudinal slope of the graded strip should not exceed 2 per cent.

15.9 A longitudinal slope changes should be gradual as practicable and abrupt changes or sudden reversals of slopes avoided.

15.10 Transverse slopes of the graded strip should be adequate to prevent accumulation of water on the surface but should not exceed 3 per cent except that to facilitate drainage the slope for the first 3 m outward from the runway or stopway edge should be negative as measured in the direction away from the runway.

15.11 The strength of the strip should be so prepared or constructed as to minimize hazards arising from differences in load bearing capacity of aeroplanes which the runway is intended to serve in the event of an aeroplane running off the runway.

11. **CLEARWAY**

16.1 The origin of a clearway should be at the end of the take-off run available.

16.2 The length of a clearway should not exceed half the length of the take-off run available.

16.3 A clearway should extend laterally to a distance of at least 75 m on each side of the extended centre line of the runway.

16.4 The ground in a clearway should not project above a plane having an upward slope of 1.25 per cent, the lower limit of this plane being horizontal line which is perpendicular to the vertical plane consisting the runway centre line and passes through a point located on the runway centre line at the end of the take-off run.

16.5 Abrupt upward changes in slope should be avoided. The portion of the clearway within a distance of 22.5 m or half the runway width, whichever is greater, on each side of the extended centre line, the slopes, slope changes and the transition from runway to clearway should generally conform with those of the runway with which the clearway is associated.

16.6 An object situated on the clearway which may endanger aeroplanes in the air shall be regarded as an obstacle and shall be removed.

12. **STOPWAY**

17.1 A stopway shall have the same width of the runway which it is associated.

17.2 Slope, slope changes and the transition from runway to stopway should generally conform with those of the runway with which the stopway is associated.

17.3 A stopway should be prepared or constructed so as to be capable, in the event of abandoned take-off, of supporting the aeroplane which the stopway is intended to serve without inducing structural damage to the aeroplane.

17.4 The surface of a paved stopway should be constructed to provide good coefficient of friction to be compatible with that of the associated runway when the stopway is wet.

17.5 The friction characteristics of an unpaved stopway should not be substantially less than that of the runway with which the stopway is associated.

13. TAXIWAY

18.1 Taxiways should be provided to permit the safe and expeditious surface movement of aircraft.

18.2 Sufficient entrance and exit taxiways for a runway should be provided to expedite the movement of aeroplanes to and from the runway.

18.3 Sufficient entrance and exit taxiways for a runway should be provided to expedite the movement of aeroplanes to and from the runway.

18.4 TAXIWAY CLEARANCE DISTANCE

18.4.1 The clearance distance between the outer main wheel of the aeroplane and the edge of taxiway, when the cockpit of the aeroplane remains over the taxiway centre line markings, shall not be less -

Code Letter A	:	1.5 m
Code Letter B	:	2.25 m
Code Letter C	:	3 m, if the taxiway is intended to be used by aeroplanes with a wheel base less than 18 m; 4.5 m, if the taxiway is intended to be used by aeroplanes with a wheel base less equal or greater than 18 m.

18.5 TAXIWAY WIDTH

18.5.1 The width, on straight portion of taxiway, shall not be less than -

Code Letter A	:	7.5 m
Code Letter B	:	10.5 m
Code Letter C	:	15 m, if the taxiway is intended to be used by aeroplanes with a wheel base less than 18 m; 18 m, if the taxiway is intended to be used by aeroplanes with a wheel base less equal or greater than 18 m.

18.6 TAXIWAY CURVES

18.6.1 Changes in direction of taxiways should be as few and small as possible. The radii of the curve should be compatible with the manoeuvring capability and normal taxiing speeds of the aeroplanes for which the taxiway is intended.

18.6.2 The clearance distance between the outer main wheel of the aeroplane and the edge of taxiway, when the cockpit of the aeroplane remains over the taxiway centre line markings, shall not be less -

Code Letter A	:	1.5 m
Code Letter B	:	2.25 m
Code Letter C	:	3 m, if the taxiway is intended to be used by aeroplanes with a wheel base less than 18 m; 4.5 m, if the taxiway is intended to be used by aeroplanes with a wheel base less equal or greater than 18 m.

18.6.3 To achieve the clearance distance extra width may be provided at curves.

18.7 JUNCTIONS AND INTERSECTIONS

18.7.1 To facilitate the movement of aeroplanes, fillets should be provided at junctions and intersections of taxiways with runways, aprons and other taxiways. The design of the fillets should ensure minimum wheel clearance are maintained.

18.8 TAXIWAY MINIMUM SEPARATION DISTANCES

18.8.1 The following minimum separation distances shall be achieved -

Code Letter	Between taxiway centreline and runway centreline [metres] (1)	Between taxiway centreline to taxiway centreline [metres] (2)	Between taxiway centreline, other than aircraft stand taxilane, to object [metres] (3)	Between aircraft stand taxilane, to object [metres] (4)
A	37.5	23.75	16.25	12
B	42	33.5	21.5	16.5
C	**48**	44	26	24.5

18.8.2 The distances in column (1) do not guarantee sufficient clearance behind a holding aeroplane to permit the passing of another aircraft on a parallel taxiway.

18.9 LONGITUDINAL SLOPE

18.9.1 The longitudinal slope of a taxiway should not exceed -

Code Letter A	:	3 per cent
Code Letter B	:	3 per cent
Code Letter C	:	1.5 per cent

18.9.2 Where slope changes cannot be avoided, the transition from one slope to another should be accomplished by a curved surface with a rate of change not exceeding - 1 per cent per 30 m [minimum radius of curvature of 2 500 m].

Code Letter A	:	1 per cent per 25 m [minimum radius of curvature of 2 500 m].
Code Letter B	:	1 per cent per 25 m [minimum radius of curvature of 2 500 m].
Code Letter C	:	1 per cent per 30 m [minimum radius of curvature of 3 000 m].

18.9.3 There shall be an unobstructed line of sight from -

a. for code letter A, any point 1.5 m above a taxiway, able to see the whole surface of the taxiway for a distance of 150 m; and

b. for code letter B, any point 2 m above a taxiway, able to see the whole surface of the taxiway for a distance of 200 m; and

c. for code letter C, any point 3 m above a taxiway, able to see the whole surface of the taxiway for a distance of 300 m.

18.10 TRANSVERSE SLOPES

18.10.1 The transverse slope of a taxiway should be sufficient to prevent accumulation of water on taxiway but should not exceed -

Code Letter A	:	2 per cent
Code Letter B	:	2 per cent
Code Letter C	:	1.5 per cent

18.11 **STRENGTH OF TAXIWAYSS**

18.11.1 The strength of a taxiway should at least be equivalent to that of the runway it serves, due consideration being given to the fact that a taxiway will be subjected to greater density of traffic and, as a result of slow moving and stationary aeroplanes, to higher stress than the runway it serves.

18.12 **SURFACE OF TAXIWAYS**

18.12.1 The surface of a taxiway should be constructed without irregularities that cause damage to aeroplane structures.

18.12.2 If a taxiway is paved, it shall be so constructed as to provide good friction characteristics when the taxiway is wet.

14. TAXIWAY STRIPS

19.1 A taxiway, other than aircraft stand taxilane, shall be included in a strip.

19.2 A taxiways strip shall extend symmetrically on each side of the centre line of the taxiway through the length of the taxiway -

Code Letter A	:	16.25 m
Code Letter B	:	21.5 m
Code Letter C	:	26 m

19.3 The taxiways strip shall provide an area clear of objects which may endanger taxiing aeroplanes.

19.4 The taxiways strip shall be graded to a distance from the centre line of the taxiway to at least -

Code Letter A	:	11 m
Code Letter B	:	12.5 m
Code Letter C	:	19 m

19.5 The surface of the strip should be flushed at the edge of the taxiway or shoulder, if provided, and the graded portion should not have an upward transverse slope exceeding -

Code Letter A	:	3 per cent
Code Letter B	:	3 per cent
Code Letter C	:	2.5 per cent

the upward slope being measured with reference to the transverse slope of the adjacent taxiway surface and not the horizontal. The downward transverse slope should not exceed 5 per cent measured with reference to the horizontal.

15. RUNWAY HOLDING POSITION

20.1 A runway-holding position or positions shall be established on the taxiway, at the intersection of a taxiway and a runway.

20.2 A runway-holding position shall be established on a taxiway if the location or alignment of the taxiway is such that a taxying aircraft or vehicle can infringe an obstacle limitation surface.

20.3 The distance between a runway-holding position established at a taxiway-runway intersection and the centre line of a runway shall be 30 m.

16. APRONS

21.1 Apron should be provided where necessary to permit on- and off-loading of passengers, cargo or mail as well as the servicing of aircraft without interfering with the aerodrome traffic.

21.2 The total apron area should be adequate to permit handling of aerodrome traffic at its maximum anticipated density.

21.3 Each part of an apron should be capable of withstanding the traffic of the aircraft it is intended to serve, due consideration being given to the fact that some portions of the apron will be subjected to a higher density of traffic and, as a result of slow moving or stationary aircraft to higher stresses than a runway

21.4 Slopes on an apron, including those on an aircraft stand, should be sufficient to prevent accumulation of water on the surface of the apron but should be kept as level as drainage requirements permit.

21.5 On aircraft stand, the maximum slope should not exceed 1 per cent.

21.6 An aircraft stand shall provide the following minimum clearance between an aircraft using the stand and any adjacent building, aircraft on another stand and other objects -

Code Letter A	:	3 m
Code Letter B	:	3 m
Code Letter C	:	4.5 m

21.7 On aprons, consideration shall also has to be given to the provision of service roads and to manoeuvring and storage area for ground equipment.

OBSTACLE RESTRICTION

17. OBSTACLE LIMITATION REQUIREMENTS

22.1 The following obstacle limitation surfaces shall be established, as described in ASD 401, for a non-instrument runway –

a. approach surface;

b. transitional surface;

c. inner horizontal surface;

d. conical surface; and

e. take-off climb surface.

22.2 The slopes of the surfaces shall not be greater than, and their dimensions not less than those specified in ASD 401.

22.3 All height and slope dimensions shall be relative to a datum which shall be a horizontal plane whose elevation is the elevation of the lowest threshold of the runway.

22.4 New objects or extension of existing objects shall not be permitted above any of the surfaces above except when, in the opinion of the Authority, the new object or extension would be shielded by an existing immovable object.

22.5 Existing objects above any of the obstacle limitation surfaces should, as far as practicable be removed except when, in the opinion of the Authority, the object is shielded by an existing immovable object or, after an aeronautical study, that the object would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes.

VISUAL AIDS

18. An airstrip meant for use by day and then only in good visibility conditions will need to display markings only. On the other hand, if the airstrip is intended for use by night it will need to be lighted as well.

19. An airstrip classified as non-instrument shall not be operated during restricted visibility conditions or instrument meteorological conditions by day or night.

20. WIND DIRECTION INDICATOR

25.1 An airstrip shall be equipped with at least one wind direction indicator.

25.2 A wind direction indicator shall be located so as to indicate the wind conditions and shall be visible from aircraft in flight or on the movement area, and in such a way as to be free from the effects of air disturbances caused by nearby objects.

25.3 A wind direction indicator shall be a truncated cone made of lightweight fabric and shall have minimum dimensions of 3.6 m in length and 0.9 m diameter at the larger.

25.4 The colour of the wind direction indicator should be so selected so as to make it clearly visible and understandable, having regard to background. Where practicable, a single colour, orange should be used. Where a combination of two colours is required to give adequate conspicuity against changing backgrounds, they should be orange and white, or red and white, and should be arranged in five alternate bands the first and last band being the darker colour.

25.5 The location of the wind direction indicator shall be marked by a circular band 15 m in diameter and 1.2 m wide. The band should be centred about the wind direction indicator and should be in a colour chosen to give adequate conspicuty, preferably white.

25.6 A wind direction indicator shall at a airstrip intended for use at night shall be illuminated

21. MARKINGS AND MARKERS

26.1 The following markings shall be provided for a paved runway –

a. runway designation marking;

b. threshold marking;

c. runway centre line marking; and

d. runway side stripe marking.

26.2 The following markings shall be provided for a unpaved runway –

a. runway designation marking;

b. threshold marking; and

c. runway boundary markings or markers.

26.3 The following markings shall be provided for a paved taxiway –

a. taxiway centre line marking; and

b. runway-holding position marking.

26.4 The following markings shall be provided for an unpaved taxiway –

a. runway-holding position marking.

26.5 The following markings should be provided for a paved apron –

a. aircraft stand marking.

26.6 Runway markings shall be white.

26.7 Taxiway markings shall be yellow.

26.8 RUNWAY DESIGNATION MARKING

26.8.1 A runway designation marking shall be provided at a paved runway and an unpaved runway.

26.8.2 A runway designation marking shall be located –

a. for a paved runway, where the threshold is marked with stripes, at 12 succeeding the threshold markings, as in Appendix B; and

b. for an unpaved runway, where the threshold is marked by solid white band, at 6 m succeeding the band, as in Appendix C.

26.8.3 A runway designation marking shall consist of a two-digit number. The two digit-number shall be the whole number nearest to one-tenth of the magnetic North when viewed from the direction of approach. When the above rule would give a single digit number, it shall be preceded by a zero.

26.8.4 The numbers, and letters where applicable, shall be in the form and proportion shown in Appendix D.

26.9 **THRESHOLD MARKING**

26.9.1 A threshold marking shall be provided at a paved runway and an unpaved runway.

26.9.2 A threshold marking shall be marked as follows -

a. for paved runways, where the threshold is marked with stripes –

i. the stripes shall commence 6 m from threshold;

ii. the number of stripes shall be in accordance with the runway width –

Runway Width	Number of stripes
18 m	4
23 m	6

iii. the stripes shall be at least 30 m long and approximately 1.8 m wide with spacing of approximately 1.8 m between them. A double spacing shall be used to separate the two stripes nearest the centre line of the runway; and

iv. the stripes shall extend laterally to within 3 m of the edge of runway.

b. for unpaved runways, where the threshold is not marked with stripes, a transverse stripe of a solid white band 1.5 m wide shall extend across the full width of the runway.

26.9.3 Where the threshold is displaced from the extremity of the runway, the beginning of the runway shall be marked with a transverse stripe not less than 1.8 m wide extend across the full width of the runway.

26.9.4 Arrows, 30 m in length, spaced at intervals of 20 m with the point of the arrow immediately preceding the displaced threshold at 20 m from the threshold markings or, threshold markings at not available, the transverse stripe. The arrow head shall have a length of one-third of the length of the arrow. Appendix E.

26.10 **RUNWAY CENTRE LINE MARKING**

26.10.1 Runway centre line marking shall be provided on a paved runway.

26.10.2 Runway centre line marking shall be located along the centre line of the runway between the runway designation markings.

26.10.3 Runway centre line marking shall consist of a line of uniformly spaced stripes and gaps. The length of a stripe and a gap shall not be less than 50 m or more than 75 m.

26.10.4 The length of each stripe shall be at least equal to the length of the gap or 30 m, whichever greater.

26.10.5 The width of the stripes shall not be less 0.3 m.

26.11 RUNWAY SIDE STRIPE MARKING

26.11.1 The runway side stripe marking shall be provided between the thresholds of a paved runway, to indicate the edges of the runway.

26.11.2 The runway side stripe marking shall consist of two stripes, one placed along each edge of the runway with the outer edge of each stripe approximately on the edge of the runway.

26.11.3 A runway side stripe marking shall have an overall width of at least 0.45 m.

26.12 RUNWAY BOUNDARY MARKINGS / MARKERS

26.12.1 Boundary markings or markers shall be provided between the thresholds of a unpaved runway, to indicate the edges of the runway

26.12.2 Boundary markings shall be in the form as shown in Appendix F –

a. concrete white rectangular markings;

b. length of 3 m and width of 1 m;

c. spaced at 90 m; and

d. flushed with the surface of the runway.

26.12.3 Boundary markers shall be either -

a. the type shown in Appendix G; or

b. a cone not less than 50 cm high and not less than 75 cm in diameter at the base.

26.12.4 Boundary markers spaced at 90 m along the runway edge.

26.12.5 Boundary markers shall be coloured to contrast against the background. A single colour, orange or red, or two contrasting colours, orange and white or alternatively red and white shall be used.

26.13 TAXIWAY CENTRE LINE MARKINGS

26.13.1 Taxiway centre line marking shall be provided on paved taxiway in such way to provide continuous guidance between the runway centre line and aircraft stands.

26.13.2 On straight portions of a taxiway the taxiway centre line shall be located along the taxiway centre line. On a taxiway curve the marking shall continue from the straight portion of the taxiway at a constant distance from outside edge of curve.

26.13.3 At intersection of a taxiway with a runway where the taxiway serves as an exit from the runway, the taxiway centre line should be curved into the runway centre line marking. The taxiway centre line marking should be extended parallel to the runway centre line marking for a distance of at least 30 m beyond the point of tangency.

26.13.4 Where the taxiway centre line marking is extended parallel to the runway centre line marking, it shall be located 0.9 m from the runway centre line.

26.13.5 The taxiway centre line marking shall be at least 15 cm in width and continuous in length except where it intersects with a runway-holding position.

26.14 RUNWAY-HOLDING POSITION MARKINGS

26.14.1 A runway-holding position marking shall be displayed along a runway holding position, where established.

26.14.2 A runway-holding position marking shall be as shown in Appendix H.

26.15 AIRCRAFT STAND MARKINGS

26.15.1 Aircraft stand markings shall be provided for designated parking positions on a paved apron.

26.15.2 Aircraft stand markings shall be located so as to provide the clearances specified in 21.6, when the nosewheel follows the stand markings.

26.15.3 Aircraft stand markings shall include stand identification, lead-in line, turn bar, turning line, alignment bar, stop line and lead-out line, as are required by the parking configuration.

26.15.4 Aircraft stand identification should be included in the lead-in line a short distance after the beginning of the lead-in line.

26.15.5 Where two sets of aircraft stand markings are superimposed, in order to permit more flexible use of the apron and it is difficult to identify which stand marking should be followed, or safety would be impaired if the wrong marking was followed, then the identification of the aircraft type should be added to the stand identification.

26.15.6 Lead-in line, turning line, and lead-out line shall be continuous in length and have a width of not less than 15 cm.

26.15.7 Where one or more sets of stand marking are superimposed, the lines shall be continuous for the most demanding aircraft and broken for other aircraft.

26.15.8 The curved portion of lead-in line, turning line, and lead-out line should have a radii appropriate to the most demanding aircraft type for which the markings are intended.

26.15.9 The turn bar should be located a right angles to the lead-in line, abeam the left pilot position at the point of initiation of any intended turn. It should have a length of 6 m and width of 15 cm., an include an arrowhead to indicate the direction of turn.

26.15.10 The alignment bar should be placed so as to be coincident with the extended centre line of the aircraft in the specified parking position and visible to the pilot during the final part of the parking manoeuvre. It should have a width of not less than 15 cm.

26.15.11 The stop line should be located a right angles to the alignment bar, abeam the left pilot position at the intended point of stop. It should have a length of 6 m and width of 15 cm.

22. **LIGHTS**

27.1 The following lights shall be provided at airstrip intended for use by night –

a. aerodrome beacon;

b. runway edge lights;

c. runway threshold lights;

d. runway end lights;

e. stopway lights, where stopway is provided; and

f. taxiway centre line lights, where taxiway is provided.

27.2 The following lights shall be provided with suitable intensity control –

a. runway edge lights;

b. runway threshold lights;

c. runway edge lights; and

d. taxiway centre line lights.

27.3 Elevated runway and stopway lights shall be frangible. The height shall be sufficiently low to preserve clearance for propellers of aeroplanes.

27.4 Light fixtures inset in the surface of runway, stopway and taxiway lights shall be so designed and fitted as to withstand being run over by the wheels of an aeroplane without damage either to the aeroplane or to the lights themselves.

27.5 AERODROME BEACON

27.5.1 An aerodrome beacon shall be provided at an airstrip where –

a. aircraft navigate predominantly by visual means;

b. reduced visibility are frequent; or

c. identification of the airstrip is difficult due to surrounding lights or terrain.

27.5.2 An aerodrome beacon shall be located on or adjacent to the aerodrome in an area of low ambient background lighting. The beacon should not be shielded in significant directions and does not dazzle a pilot approaching to land.

27.5.3 An aerodrome beacon shall show either green flashes alternating with white flashes, or white flashes only. The frequency of total flashes shall be from 20 to 30 per minute.

27.5.4 The lights from the beacon shall show at all angles of azimuth. The effective flash intensity shall not be less than 2000 cd.

27.6 RUNWAY EDGE LIGHTS

27.6.1 Runway edge lights shall be placed along the full length of the runway and shall be in two parallel rows equidistant from the centre line.

27.6.2 Runway edge lights shall be placed along the edges of the area declared for use as the runway or outside the edges of the area by a distance of not more than 3 m.

27.6.3 The lights shall be uniformly spaced in rows at intervals of not more than 100 m.

27.6.4 The lights on opposite sides of the runway axis shall be on lines at right angles to that axis.

27.6.5 Runway edge lights shall be fixed lights showing variable white, except -

a. in the case of displaced threshold, the lights between the beginning of the runway and the displaced threshold shall show red in the approach direction; and

b. a section of lights one-third of the runway length, at the remote end of the runway from the end at which the take-off run is started, shall show yellow.

27.6.6 Runway edge lights shall show at all angles in azimuth necessary to provide guidance to a pilot landing or taking off in either direction.

27.6.7 In all angles of azimuth, the lights shall show at angles up to 15º above the horizontal with an intensity adequate for conditions of visibility and ambient light in which use of the runway for take-off and landing is intended. In any case the intensity shall be at least 50 cd except at aerodrome without extraneous lighting the intensity of the lights may be reduced to not less than 25 cd to avoid dazzling the pilots.

27.7 **RUNWAY THRESHOLD LIGHTS**

27.7.1 Runway threshold lights shall be provided except where the threshold is displaced and wing bar lights are provided.

27.7.2 Runway threshold lights shall be placed -

a. when threshold is at the extremity of the runway, in a row right angles to the runway axis near to the extremity of the runway as possibly and, in any case, not more than 3 m outside the extremity; and

b. when the threshold is displaced, in a row right angles to the runway axis at the displaced threshold.

27.7.3 Runway threshold lights shall consist of at least 6 lights, equally spaced between the rows of the runway edge lights.

27.7.4 Wing bar lights shall be symmetrically disposed about the runway centre line at the threshold in two groups. Each wing bar shall be formed by at least 5 lights outward from, and at right angles to, the line of the runway edge lights, with the innermost light of each wing bar in line of the runway edge lights.

27.7.5 Runway threshold lights and wing bar lights shall be fixed unidirectional showing green in the direction of the approach to the runway. The intensity and beam spread of the lights shall be adequate for the conditions of visibility and ambient light in which use of the runway is intended.

27.8 RUNWAY END LIGHTS

27.8.1 Runway end lights shall be placed on a line at right angles to the runway axis as near to the end as possible and, in any case, not more than 3 m outside the end.

27.8.2 Runway end lights shall consist of at least 6 lights, equally spaced between the rows of the runway edge lights.

27.8.3 Runway end lights shall be fixed unidirectional showing red in the direction of the runway. The intensity and beam spread of the lights shall be adequate for the conditions of visibility and ambient light in which use of the runway is intended.

27.9 STOPWAY LIGHTS

27.9.1 Stopway lights shall be placed along the full length of the stopway and shall be in two parallel rows that are equidistant from the centre line and coincident with the rows of the runway edge lights. Stopway lights should also be provided across the end of the stopway on a line at right angles to the stopway axis near to the end of the stopway as possible and, in any case, not more than 3 m outside the end.

27.9.2 Stopway lights shall be fixed unidirectional showing red in the direction of the runway.

27.10 TAXIWAY CENTRE LINE LIGHTS

27.10.1 Taxiway centre line lights shall be provided to provide continuous guidance between the runway and aircraft stand.

27.10.2 Taxiway centre line lights on a taxiway, other than an exit taxiway, shall be fixed lights showing green with beam dimensions such that the light is visible from aeroplanes on or in the vicinity of the taxiway.

27.10.3 At exit taxiway, the taxiway centre line lights shall show green and yellow from their beginning near the runway centre line to edge of runway-holding position and thereafter all lights shall show green. The light nearest the runway-holding position shall show yellow. Where aircraft may follow the same centre line in both directions, all the centre line lights shall show green to aircraft approaching the runway.

27.10.4 The taxiway centre line lights shall be located on the taxiway centre line markings, except that they may be offset by not more than 30 cm.

27.10.5 The taxiway centre line lights on straight section of the taxiway should be spaced at intervals not more than 30 m, except that -

a. larger intervals of not exceeding 60 m may be used where, because of the prevailing meteorological conditions, adequate guidance is provided by such spacing;

b. intervals less than 30 m should be provided on short straight sections.

23. **OTHER VISUAL AIDS**

28.1 **PAPI / APAPI**

28.1.1 PAPI or APAPI shall be provided, where the airstrip is use for day- as well as night- operations, when one or more of the following conditions exist -

a. pilot difficult to judge the approach due to –

i. inadequate visual guidance when conducting approach over water or featureless terrain by day or in the absence of extraneous lights in the approach area by night; or

ii. misleading information such as is produced by deceptive surrounding terrain or runway slopes.

b. the presence of objects in the approach area may involve serious hazard if an aeroplane descends below the normal approach path, particularly if there are no non-visual aids or other visual aids to give warning of such objects;

c. physical conditions at either end of the runway present a serious hazard in the event of an aeroplane undershooting or overrunning the runway; and

d. terrain or prevalent meteorological conditions are such that the aeroplane may be subjected to unusual turbulence during approach.

28.1.2 The PAPI shall consist of a wing bar of 4 sharp transition multi-lamp [or paired single lamp] units equally spaced.

28.1.3 The APAPI shall consist of a wing bar of 2 sharp transition multi-lamp [or paired single lamp] units equally spaced.

28.1.4 The PAPI or APAPI shall be located on the left side of the runway unless it is physically impracticable to do so.

28.1.5 The wing bar of a PAPI shall be constructed and arranged in such manner that the pilot making an approach will -

a. when on or close to the approach slope, see the two units nearest the runway as red and the two units farthest from the runway as white;

b. when above the approach slope, see the one unit nearest the runway as red and the three units farthest from the runway as white; and when further above the approach slope, see all the units as white; and

c. when below the approach slope, see the three units nearest the runway as red and the one unit farthest from the runway as white; and when further below the approach slope, see all the units as red.

28.1.6 The wing bar of an APAPI shall be constructed and arranged in such manner that the pilot making an approach will -

a. when on or close to the approach slope, see one unit nearest the runway as red and one unit farthest from the runway as white;

b. when above the approach slope, see both the units as white; and

c. when below the approach slope, see both the units as red.

28.1.7 The light units of the PAPI and APAPI shall be located as in the basic configuration illustrated in Appendix I, and shall be mounted –

a. so as to appear to the pilot of an approaching aeroplane to substantially in a horizontal line;

b. as low as possible and shall be frangible; and

c. the distance from threshold, D_1, shall ensure that the lowest height at which a pilot will see a correct approach path indication provides the required wheel clearance over the threshold.

28.1.8 The wheel clearance over threshold requirements are as follows -

Eye-to-Wheel height of aeroplane in the approach configuration	Desired wheel clearance [metre]	Minimum wheel clearance [metre]
up to but not including 3 m	6	3*
3 m up to but not including 5 m	9	4
5 m up to but not including 8 m	9	5
8 m up to but not including 14 m	9	6

28.1.9 The PAPI and APAPI system shall be suitable for both day and night operations.

28.1.10 The colour transition from red to white in the vertical plane shall be such as to appear to an observer, at a distance of not less than 300 m, to occur within a vertical angle of not more than 3'.

28.1.11 At full intensity the red light shall have a Y coordinate not exceeding 0.320.

28.1.12 The light intensity distribution of the light units shall be as shown in Appendix J.

28.1.13 Suitable intensity control shall be provided so as to allow adjustment to meet prevailing conditions and to avoid dazzling the pilot during approach and landing.

28.1.14 Each light unit shall be capable of adjustment in elevation so that the lower limit of the white part of the beam may be fixed at any desired angle of elevation between 1º30' and at least 4º30' above the horizontal.

28.1.15 The light units shall be so designed that deposits of condensation on optically transmitting or reflecting surfaces shall interfere to the least possible extent with the light signals and shall not affect the contrast between the red and white signals and the elevation of the transition sector.

28.1.16 The approach slope shall be appropriate for use by the aeroplanes using the approach.

28.1.17 The angle of elevation settings of the light units shall ensure that aeroplanes, during the approach, are clear of all objects in the approach area -

a. for PAPI, when one white and three reds are observed; and

b. for APAPI, when one white and one red are observed.

28.1.18 The azimuth spread of the light beam shall be suitably restricted where an object located outside the obstacle protection surface of the PAPI or APAPI but within the lateral limits of the light beam, is found to extend above the plane of the obstacle protection surface. The extend of the restriction shall be such the object remains outside the confines of the light beam.

28.1.19 The dimensions and slope of the obstacle free surface that shall be established are as follows -

Length of inner edge	:	60 m
Distance from threshold	:	30 m
Divergence on each side	:	10%
Total Length	:	7500 m
Slope APAPI	:	A – 0.9º

28.1.20 New objects or extension of existing objects shall not be permitted above an obstacle free surface except when, in the opinion of the Authority, the new object or extension would be shielded by an existing immovable object.

28.1.21 Existing objects above an obstacle free surface shall be removed except when, in the opinion of the Authority, the object is shielded by an existing immovable object or, after an aeronautical study, that the object would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes.

28.1.22 Where an aeronautical study indicates that the object extending above an obstacle free surface could adversely affect the safety of operations of aeroplanes, one of the following measures shall be taken -

a. suitably raise the approach slope system;

b. reduce the azimuth spread of the system so that the object is outside the confines of the beam;

c. displace the axis of the system and its associated obstacle protection surface by no more than 5º;

d. suitably displaced the threshold; and

e. where (d) is found to be impracticable, suitably displace the system upwind of the threshold to provide an increase in threshold crossing height equal to the height of the object penetration.

RESCUE AND FIRE FIGHTING

24. LEVEL OF PROTECTION

29.1 The level of protection to be provided for rescue and fire fighting shall appropriate to the aerodrome category.

29.2 The aerodrome category shall be determined based on the longest aeroplanes using the airstrip and their fuselage width, as follows -

Aerodrome Category	Aeroplane over-all length	Maximum Fuselage Width
1	up to but not including 9 m	2 m
2	9 m up to but not including 12 m	2 m
3	12 m up to but not including 18 m	3 m
4	18 m up to but not including 24 m	4 m
5	24 m up to but not including 28 m	4 m

29.3 If after selecting the category appropriate to the longest aeroplane's over-all length, that aeroplane's width is greater than the maximum width for that category, then the category for that aeroplane shall actually be one category higher.

25. EXTINGUISHING AGENTS

30.1 Both principal and complementary agents should normally be provided at an airstrip.

30.2 The principal extinguishing agents shall be -

a. a foam meeting the minimum performance level A; or

b. a foam meeting the minimum performance level B; or

c. a combination of these agents;

except that the principal extinguishing agent for aerodromes in categories 1 and 2 should preferably meet the minimum performance level B.

30.3 The complementary extinguishing agents shall be dry chemical powder suitable for extinguishing hydrocarbon fires. When selecting dry chemical powders for use with foam, care must be exercised to ensure compatibility.

30.4 The amounts of water for foam production and the complementary agents to be provided shall be in accordance with the aerodrome category.

	Foam meeting performance level A		Foam meeting performance level B		Complementary agent
Category	**Water [L]**	**Discharge rate foam solution [L/min]**	**Water [L]**	**Discharge rate foam solution [L/min]**	**Dry chemical powders [kg]**
1	350	350	230	230	45
2	1000	800	670	550	90
3	1 800	1 300	1 200	900	135
4	3 600	2 600	2 400	1 800	135
5	8 100	4 500	5 400	3 000	180

30.5 It is permissible to replace all or part of the amount of water for foam production by complementary agent –

a. for aerodrome categories 1 and 2, up to 100 per cent of the water may be replaced by complementary agent; or

b. for aerodrome categories 3 to 5, when foam meeting performance A is used, up to 30 per cent of the water may be replaced by complementary agent.

30.6 The following equivalent shall be used for the substitution -

1 kg. complementary agent = 1.0 L water for production of foam meeting performance level A

1 kg. complementary agent = 0.66 L water for production of foam meeting performance level B

30.7 The quantity of foam concentrates provided on vehicles for foam production shall be in proportion to the quantity of water provided and the foam concentrate selected.

30.8 The discharge rate for foam solution shall not be less than the amount specified.

30.9 A reserve supply of foam concentrate and complementary agent, equivalent to 200 per cent of the quantities of these agents to be provided in the rescue and fire fighting vehicles, should be maintained on the aerodrome for vehicle replenishment purposes. Where a major delay in the replenishment of supply is anticipated, the amount of reserve supply should be increased.

26. RESPONSE TIME

31.1 A response time not exceeding three minutes to any point of each operational runway and any other part of the movement area, in optimum conditions of visibility and surface conditions shall be achieved.

31.2 Any other vehicle required to deliver the amounts of extinguishing agents, shall arrive no more than one minute after the first responding vehicle [s] so as to provide continuous agent application.

31.3 A system of preventive maintenance of rescue and fire fighting vehicles shall be employed to ensure effectiveness of the equipment and compliance to the specified response time.

27. RESCUE EQUIPMENT

32.1 Rescue equipment commensurate with the level of protection shall be provided as in Appendix K.

28. NUMBER OF FIRE VEHICLES

33.1 The minimum number of rescue and fire fighting provided at an aerodrome should be -

Aerodrome Category	Number of RFF vehicles
1	1
2	1
3	1
4	1
5	1

29. FIRE STATION

34.1 Rescue and fire fighting vehicles should be housed in a fire station.

34.2 The fire station should be located so that the access for rescue and fire fighting vehicles into the runway area is direct and clear, requiring minimum number of turns.

30. COMMUNICATION AND ALERTING SYSTEM

35.1 A discrete communication system should be provided between linking a fire station to the aerodrome control tower, and rescue and fire fighting vehicles.

35.2 An alerting system for rescue and fire fighting personnel should be provided at the fire station that is capable of being operated from that station and the aerodrome control tower.

31. EMERGENCY ACCESS ROADS

36.1 Emergency access roads should be provided on an airstrip so as to facilitate achieving minimum response time, and with the following considerations –

i. particular attention should be given to the provision of ready access to approach areas up to 1 000 m from the threshold, or at least the aerodrome boundary; and

ii. where a fence is provided, the need for convenient access to the outside areas.

36.2 Emergency roads should be capable of supporting the heaviest vehicle which will use them, and be usable in all weather conditions.

36.3 When surface of the emergency access roads is indistinguishable from the surrounding area, edge markers should be placed.

32. PERSONNEL

37.1 All rescue and fire fighting personnel shall be adequately trained to perform their duties in an efficient manner.

37.2 All rescue and fire fighting personnel shall participate in live fire drills commensurate with the types of aircraft and types of fire fighting equipment in use at the airstrip, including pressure-fed fuel fires.

37.3 The rescue and fire fighting personnel training programme shall include training in human performance, including team coordination.

37.4 The number of fire fighting personnel provided at an airstrip shall take into consideration that sufficient trained personnel are -

a. readily available to ride the rescue and fire fighting vehicles and to operate the equipment at maximum capacity;

b. deployed in a way that ensures minimum response times can be achieved;

c. capable to ensure that continuous agent application at the appropriate rate can be fully maintained; and

d. able to operate other equipments associated with rescue and fire fighting operations including hand lines, ladders and other rescue and fire fighting equipments.

37.5 All responding rescue and fire fighting personnel shall be provided with protective clothing and respiratory equipment to enable them to perform their duties in an effective manner.

DEVIATIONS

33. The Department of Civil Aviation shall notify and publish deviations from any Standards and Recommended Practices contained in ICAO Annex 14 in the Aeronautical Information Services publications in compliance to the Article 38 of the Convention on International Civil Aviation.

34. The Appendices to this Directive shall be taken, construed, read and be part of this Directive.

DATO' IR. KOK SOO CHON
Director General
Department of Civil Aviation
Malaysia

Dated: 22 September 2005

AMENDMENT RECORD

Amendment Number	Amendment Date	Incorporated by	Incorporated on
1/2006	4 Jan 2006	Para 2	4 Jan 2006
2/2006	4 Jan 2006	Para 18.8.1	4 Jan 2006

APPENDIX A

PARTICULARS TO BE INCULDED IN AN AERODROME MANUAL

PART I : GENERAL

General information, including the following –

a. name of airstrip owner/operator, and address and telephone number[s] at which the owner/operator can be contacted at all times;

b. purpose and scope of the aerodrome manual;

c. the condition for use of the airstrip, including operational limitation and restriction;

d. the system for recording aircraft movements; and

e. obligations of the airstrip owner/operator.

PART 2 : PARTICULARS OF THE AIRSTRIP SITE

General information, including the following –

a. a plan of the airstrip showing the main facilities, including visual aids provided;

b. a plan showing the airstrip boundaries; and

c. a plan showing the position of the airstrip in relation to nearest city, town or other populous area, within 5000m radius of the airstrip.

PART 3 : PARTICULARS OF THE AIRSTRIP

3.1 GENERAL INFORMATION

a. the name of the airstrip;

b. the location of the airstrip from the nearest town and nearest aerodrome;

c. the geographical coordinates of the aerodrome reference point [WGS-84];

d. the elevation of the airstrip;

e. elevation of each threshold; and

f. details of aerodrome beacon [if provided].

3.2 AIRSTRIP DIMENSIONS

a. Runway – true bearing to one-hundredth of a degree, designation number, length, width, displace threshold location to the nearest metre, slope, surface type, type of runway;

b. Strip – length, width to the nearest metre, surface type;

c. Stopway – length, width to the nearest metre, surface type;

d. Taxiway – designation, width to the nearest metre, surface type;

e. Apron – surface type, aircraft stands; and

f. Clearway – length to nearest metre, ground profile.

3.3 GEOGRAPHICAL COORDINATES

a. thresholds;

b. taxiway centerline points;

c. aircraft stands; and

d. significant obstacles in the approach and take-off paths, and the top elevation.

3.4 DECLARED DISTANCES

a. take-off run available [TORA];

b. take-off distance available [TODA];

c. accelerate-stop distance available [ASDA]; and

d. landing distance available [LDA].

3.5 PAVEMENT STRENGTH

a. ACN-PCN.

3.6 VISUAL AIDS

a. visual aids viz. markings and lighting

b. wind direction indicator;

c. PAPI

3.7 RESCUE AND FIRE FIGHTING

a. level of protection.

PART 4 : AERODROME OPERATIONS PROCEDURES

4.1 AERODROME REPORTING PROCEDURES

Particulars of procedures for notifying any changes to the infrastructure, facilities and operational procedures, including –

a. arrangement for reporting changes;
b. arrangement for requesting issue of NOTAM;
c. arrangement for amendment of the AIP; and
d. recording of changes.

4.2 ACCESS TO AIRSTRIP AREA

Procedure for the preventing of the unauthorized entry of person[s], vehicles or others into the airstrip area including facilities provided to prevent such occurrence.

4.3 AERODROME EMERGENCY PLAN

Particulars of the airstrip emergency plan, including the following –

a. plans for dealing with emergencies occurring at the airstrip or in its vicinity;
b. details of test for equipment to be used in emergencies, including frequency of those tests; and
c. details of exercise to test the emergency plan, including the frequency of those exercises.

4.4 RESCUE AND FIRE FIGHTING

Particulars of facilities, equipment, personnel and procedures for meeting the rescue and fire fighting requirements.

4.5 INSPECTION OF AIRSTRIP

Particulars of procedures for the inspection of the airstrip area and obstacle limitation surfaces, including –

a. details of inspection intervals and times;
b. inspection checklist and logbook; and
c. reporting of inspection findings and correction of unsafe conditions.

4.6 VISUAL AIDS AND ELECTRICAL SYSTEMS

Particulars of procedures for the inspection and maintenance, aeronautical lights [including obstacle lights], signs, markers and electrical systems –

a. arrangements for inspection;
b. reporting and recording of inspection findings;
c. correction of deficiencies;
d. arrangements for routine maintenance; and
e. arrangements secondary power supply.

4.7 MAINTENANCE OF AIRSTRIP AREA

Particulars of procedures for the inspection and maintenance of airstrip area –

a. arrangements for inspection;
b. maintenance of paved areas;
c. maintenance of unpaved areas;
d. maintenance of markings; and
e. maintenance of drainage.

4.8 AIRSTRIP SAFETY MANAGEMENT

Particulars of procedures to ensure safety during airstrip operations -

a. arrival procedures [including engine shut-down];
b. departing procedure [including engine-start];
c. fuelling procedures and safety precautions;
d. apron sweeping and cleaning;
e. arrangements for reporting incidents and accidents; and
g. personnel safety procedures.

4.9 AIRSIDE VEHICLE CONTROL

Particulars of procedures for the control of surface vehicles -

a. applicable traffic rules; and
b. method of issuing vehicle and driving permits.

4.10 WILDLIFE MANAGEMENT

Particulars of procedures to deal with danger posed to aircraft operations by the presence of birds or mammals -

a. arrangements for assessing wildlife hazards; and
b. arrangement for implementing wildlife control programmes.

4.11 OBSTACLE CONTROL

Particulars setting out the procedures for -

a. controlling obstacles within the authority of owner;
b. monitoring development within the obstacle limitation surfaces; and
c. coordination for controlling new developments in vicinity of the airstrip.

4.12 REMOVAL OF DISABLED AIRCRAFT

Particulars of the procedures for removing of a disabled aircraft, including -

a. role of airstrip owner and holder of the aircraft certificate of registration;
b. arrangements for notifying holder of the aircraft certificate of registration; and
c. arrangements for obtaining equipment and personnel to remove aircraft.

4.13 HANDLING OF HAZARDOUS MATERIALS

Particulars of the procedures for safe handling and storage of hazardous materials, including -

a. arrangements for special areas on the airstrip for storage of inflammable liquids [including aviation fuel] and other hazardous material; and
b. method for the delivery, storage, dispensing and handling of hazardous material.

PART 5 : AIRSTRIP ADMINISTRATION

Particulars of the airstrip administration, including –

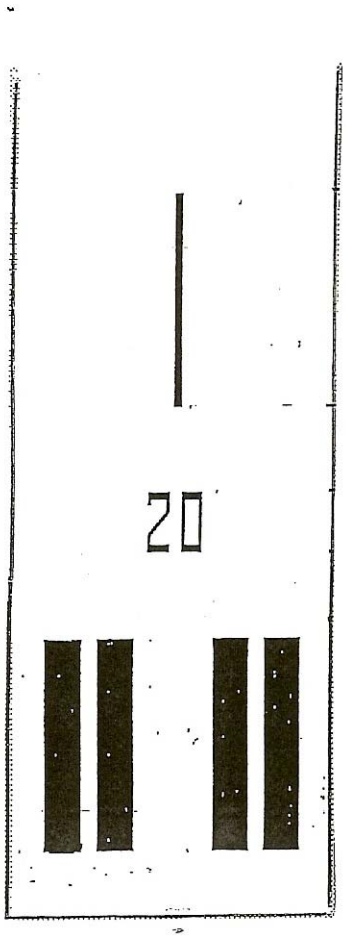
a. the airstrip organizational chart showing the name and position of key personnel;

b. the duty-list and responsibilities of key personnel, in particular the Aerodrome Manager and Aerodrome Duty Officer; and

c. the name and telephone number of the Aerodrome Manager.

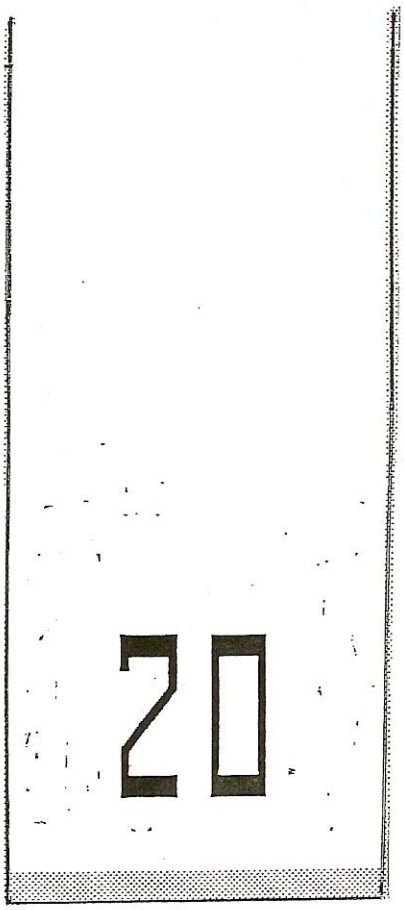
APPENDIX B

RUNWAY DESIGNATION, CENTRE LINE AND THRESHOLD MARKING FOR PAVED RUNWAYS



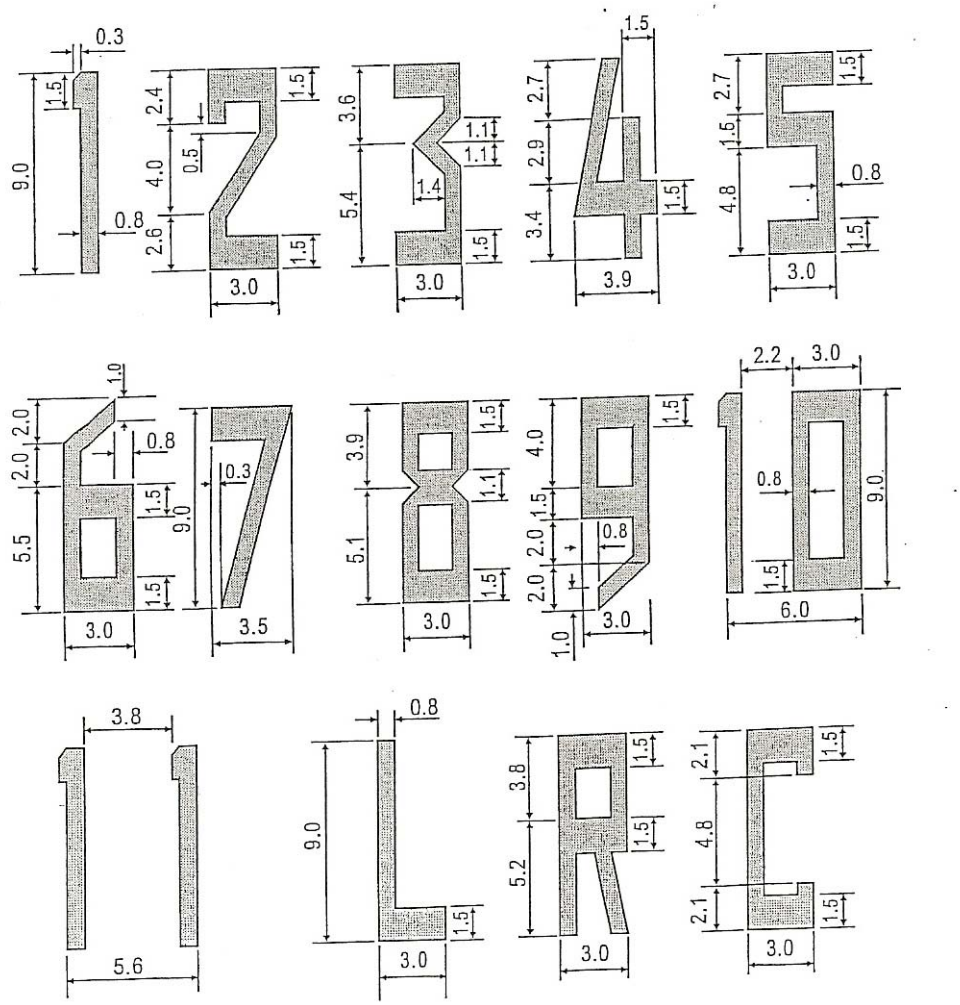
APPENDIX C

RUNWAY DESIGNATION AND THRESHOLD MARKING FOR UNPAVED RUNWAYS



APPENDIX D

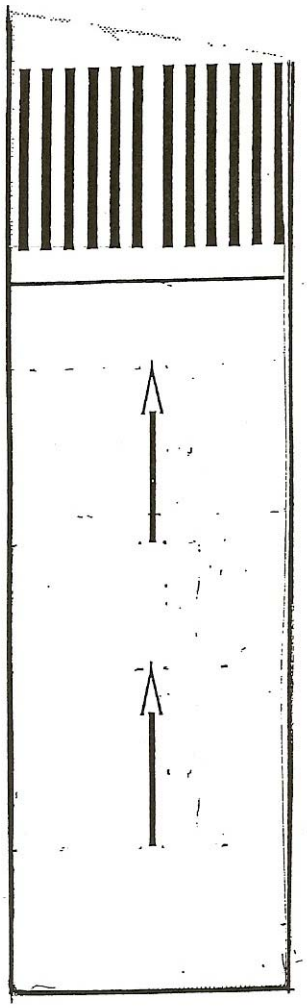
FORM AND PROPORTION OF NUMBERS AND LETTERS FOR RUNWAY DESIGNATION MARKINGS



Note.— All units are expressed in metres.

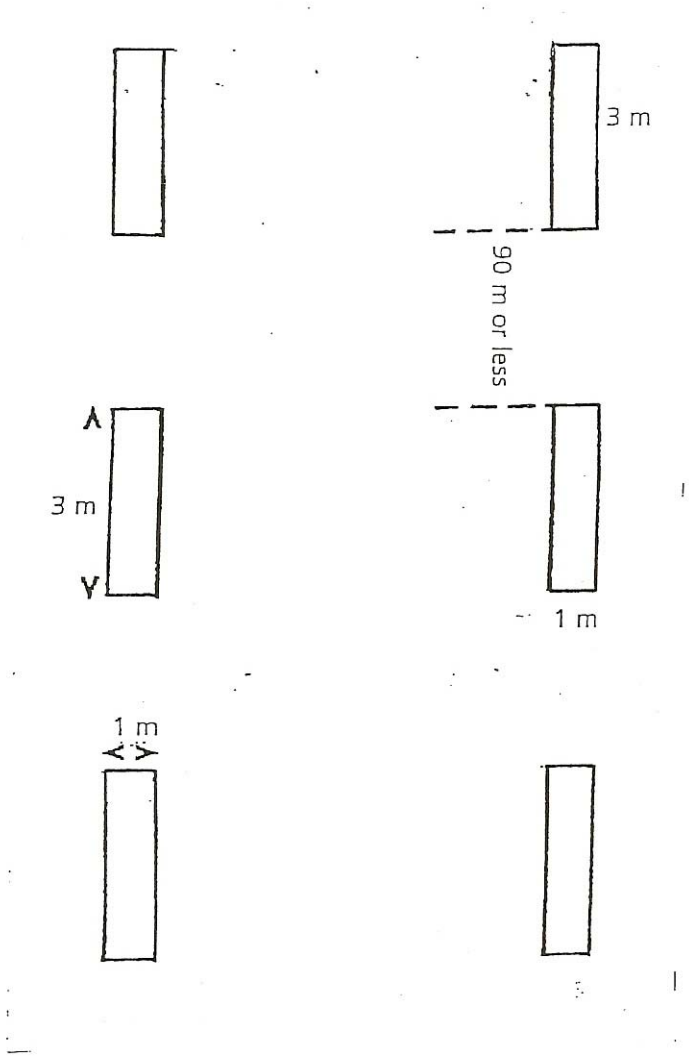
APPENDIX E

DISPLACED THRESHOLD MARKINGS



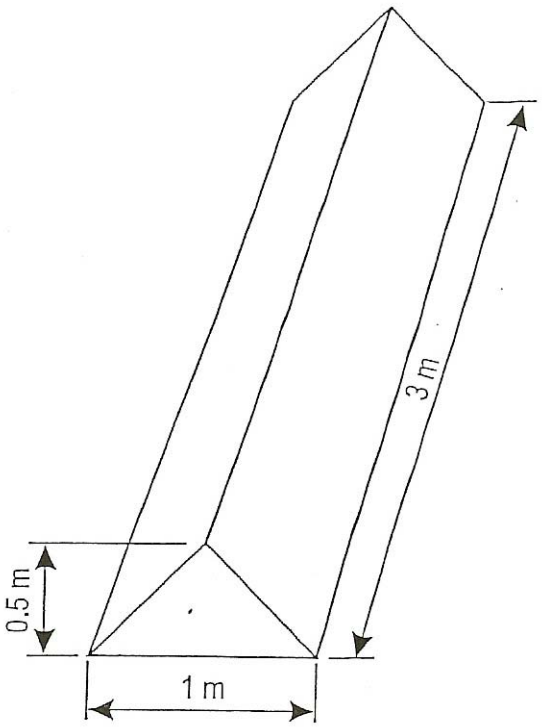
APPENDIX F

RUNWAY BOUNDARY MARKINGS



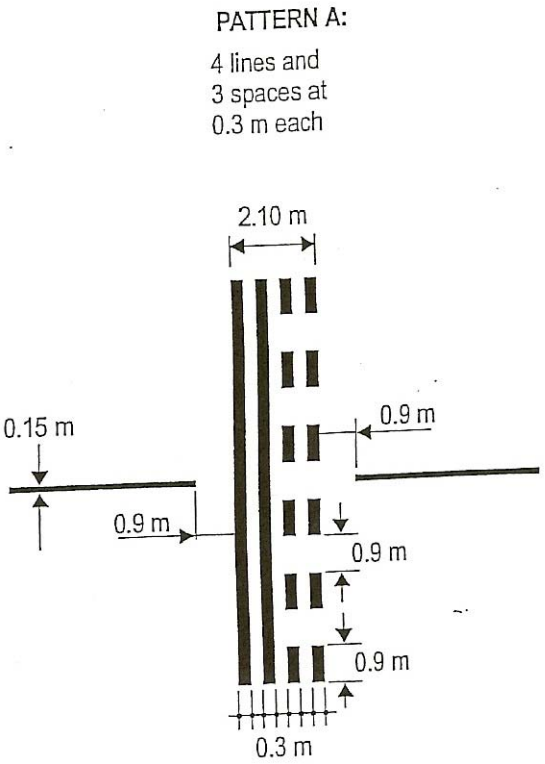
APPENDIX G

RUNWAY BOUNDARY MARKERS



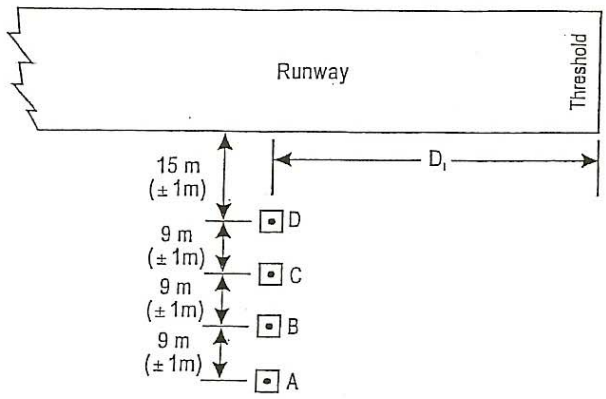
APPENDIX H

RUNWAY HOLDING MARKINGS

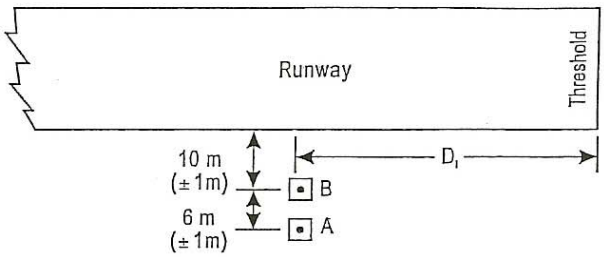


APPENDIX I

SITTING OF PAPI AND A-PAPI



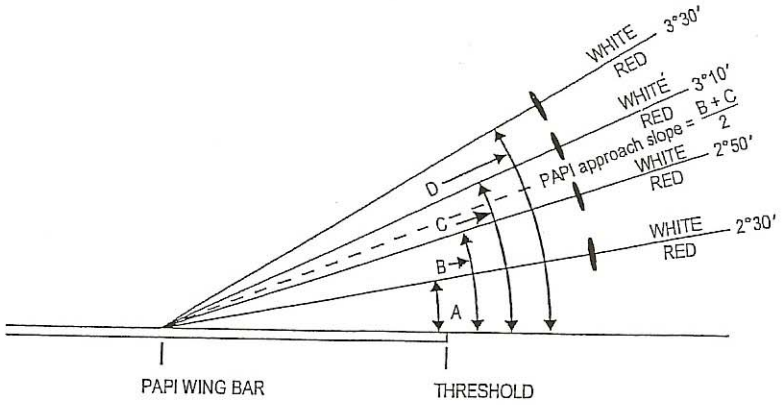
Typical PAPI wing bar



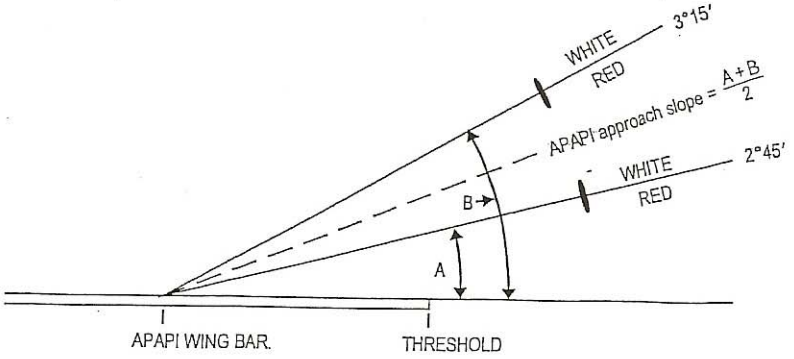
Typical APAPI wing bar

APPENDIX I

LIGHT BEAMS AND ANGLE OF ELEVATION PAPI AND A-PAPI



A — 3° PAPI ILLUSTRATED



B — 3° APAPI ILLUSTRATED

APPENDIX J

LIGHT BEAMS AND ANGLE OF ELEVATION SETTING

APPENDIX K

RESCUE EQUIPMENT ON RFF VEHICLES

Equipment	Aerodrome category	
	1 - 2	3 - 5
Adjustable wrench	1	1
Axe, rescue, large non-wedge type	-	1
Axe, rescue, small non-wedge or aircraft type	1	2
Cutters, bolt, 61 cm	1	1
Crowbar, 95 cm	1	1
Chisel, cold 2.5 cm	-	1
Flashlight / handlamps	2	3
Hammer, 1.8 kg	-	1
Hook, grab or slaving	1	1
Saw, metal cutting or hacksaw, heavy duty complete with spare blades	1	1
Blanket, fire resistant	1	1
Ladder, length appropriate to aircraft type	1	1
Ropeline, 15 m in length	1	1
Pliers, 17.8 cm, side cutting	1	1
Pliers, slip joint 25 cm	1	1
Set of assorted screwdrivers	1	1
Snippers, tin	1	1
Chocks, 10 cm high	1	1
Powered rescue saw complete with two blades; or – pneumatic rescue chisel complete – plus spare cylinder, chisel, an retaining spring	1	1
Seat belt / harness cutting tool	1	1
Harness knife complete with sheath	1	1
Gloves, fire resistant [unless issued to individual crew]	2 pairs	3 pairs
Breathing apparatus and spare cylinder	One set per fire fighter on duty	
Oxygen inhaler	-	1
Hydraulic or pneumatic forcing tool	-	1
Medical first aid kit	1	1
Protective clothing	One set per fire fighter on duty	
Strecher	1	2